

## PATENT SPECIFICATION



Application Date: June 20, 1939. No. 17943/39.

530,180

Complete Specification Left: June 20, 1940.

Complete Specification Accepted: Dec. 6, 1940.

## PROVISIONAL SPECIFICATION

## Improvements in or relating to Freezing Machines

We, T. GIUSTI & SON LIMITED, a Company, organised under the Laws of Great Britain, and TITO GIUSTI and RAOLO BENVENUTO GIUSTI, both Italian Nationals, and all of 79A, Copenhagen Street, Caledonian Road, London, N.1. do hereby declare the nature of this invention, to be as follows:—

This invention relates to freezing machines and has for its object the provision of an improved construction thereof as well as a method of producing the same.

According to a preferred construction of the invention which is hereinafter described in detail and which is particularly intended for rapidly freezing ice cream, we make the freezing chamber proper in the form of a stainless steel cup with cylindrical walls which, when the machine is assembled, will be in a horizontal position, its extremities being for convenience, termed the forward and rear ends. The steel cup is open at its forward end and has its peripheral edge formed as a flange. The bottom of the steel cup, that is the rear end of the freezing chamber, has a central hole. A bush is welded or otherwise secured on the outside of this end around this hole.

A gun metal ring, substantially of F-section is then brazed or otherwise securely mounted on the outside of the steel cup with its long limb bearing tightly against the aforesaid flange at the forward end of the steel cup and the small limbs of the metal ring directed towards the rear end of the steel cup. A cylindrical jacket formed of two concentric cylinders is placed in the groove of the metal ring at the forward end and flooded with solder or made gas tight by any suitable means. A second reinforced gunmetal disc acts as a cap to the rear end its periphery also having a groove, which fits over the end of the jacket and a centre hole which engages with the bush, welded to the steel cup, a gas tight seal being again made by flooding with solder and a stainless jacketed gas tight cylinder is thus obtained.

An inlet pipe for the refrigerant is applied to and passes through the jacket

to the space between the jacket and the steel cup whilst diametrically opposite to this inlet pipe the interior cylinder forming the jacket is provided with a series of holes causing the interior of such jacket to communicate with the space between the jacket and the steel cup. An outlet hole for the cooling medium is further applied to the jacket again diametrically opposite the communicating holes and communicates with the interior thereof. It will be seen that by this arrangement of the circuit, the cooling medium on entering is caused to impinge directly on the outside of the steel cup and cannot reach the outlet pipe without flowing entirely there-around and through the holes in the jacket, flowing back entirely round outer jacket.

A radially ribbed or otherwise reinforced disc with a peripheral flange, a wooden packing or insulation and a rear side bracket are then applied in this order to the rear end of the composite cylinder. The packing and rear side bracket, are securely held together by a suitable union passing through the jackets of cylinder. A front side bracket is, in addition, placed around the flanged, forward end of the steel cup and secured to the rear side bracket by tie rods. Both the front and rear side brackets have lugged feet adapted to be screwed to the frame of the machine. An insulation of any suitable nature is also applied to the cylindrical outside surface of the jacket.

A spindle is passed through and guided in the aforesaid union and is driven from a suitable source of power preferably disposed within the frame of the machine through a two-speed clutch, or such spindle might be driven directly from such source of power for example through a chain drive. An auxiliary side bracket is moreover mounted rearward of the rear side bracket above referred to when the freezing chamber, driving and other associated means are completely assembled in the manner described, and a hood is placed over these means and conveniently secured between the forward and auxiliary side bracket to give the whole a neat outer appearance.

The open forward end of the freezing chamber is adapted to be hermetically sealed by an appropriately hinged cover provided with suitable inlet and outlet 5 ports for the cream to be frozen. The outlet port is disposed in the lower portion of the hinged cover level with the lowermost portion of the cylindrical interior of the steel cup and adapted to be 10 sealed in a water-tight manner by a suitably shaped spring-pressed plate and a lever attached thereto.

A combined scraper and beater, herein- 15 after referred to as the agitator, is adapted to be rotatably and removably mounted within the freezing chamber so that it may be driven by the spindle above referred to. This agitator preferably 20 consists of a frame of rods comprising a central main rod, two transverse rods secured medially and at right angles to said central rod and two side rods dis- 25 posed parallel to the main rod, the frame being secured with its ends between the said transverse rods. The rear end of the main rod is grooved for engagement in a corresponding projection on the end of the spindle projecting into the interior of the steel tube through the union above 30 referred to and the forward end of the main rod is conically pointed for engagement with a conical recess in the above mentioned cover. Scrapers are mounted in staggered relationship on the side rods 35 and the transverse rods such that when the agitator is revolving within the freezing chamber, the whole of the interior wall thereof will be swept thereby.

The scrapers are advantageously 40 shaped and have their extremities in the form of stirrups so that they may be

readily secured to the side and transverse rods by means of pins passed through the limbs of such stirrups and lodged in 45 grooves or notches in the side and transverse rods. A small freedom of movement of the scrapers relative to the rods carrying them is thus ensured as a result of which, when the agitator is revolving 50 within the freezing chamber, the scrapers will be forced centrifugally against the interior wall thereof, whilst when the agitator is at rest, the scrapers come out of contact with the interior wall of the freez- 55 ing chamber and, when the hinged cover is opened, the agitator may be readily removed without the scrapers damaging the interior wall of the freezing chamber.

Beaters in the form of propellers or the like are further mounted on the central 60 main rod and adapted to take up the frozen cream scraped from the wall of the freezing chamber and disintegrate it in well known manner. The scrapers and 65 beaters are moreover arranged in such a manner that the frozen cream is fed towards the hinged cover similarly to a worm conveyor so that it may be removed from the freezing chamber by opening the 70 outlet port above referred to without opening the hinged cover.

It will thus be seen that the present invention provides a comparatively 75 simple and extremely compact device with many advantages over those in current use.

Dated this 20th day of June, 1939.

CHATWIN & COMPANY,  
253, Gray's Inn Road, London, W.C.1.  
Patent Agents for the Applicants.

## COMPLETE SPECIFICATION

### Improvements in or relating to Freezing Machines

We, T. GIUSTI & SON LIMITED, a Company organised under the Laws of Great Britain, and TIRO GIUSTI and 80 RAOLO BENVENUTO GIUSTI, both Italian Nationals, and all of 79A, Copenhagen Street, Caledonian Road, London, N.1, do hereby declare the nature of this invention, and in what manner the same 85 is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to freezing machines of the kind comprising a freez- 90 ing chamber surrounded by a brine cylinder or cylinders and through which passes a shaft fitted with beaters, and it has for its object the provision of an improved and simplified construction 95 thereof.

According to the invention the freezing machine comprises a stationary substan- 100 tially cylindrical cup open at the front end and there provided with a flange, its rear end having a central bush to receive the end of an externally driven spindle adapted to drive an agitator mounted within the cup, a jacket surrounding said cup composed of a pair of cylindrical 105 members assembled gas-tight between flanged rings at each end of the machine and appropriately coupled together to form a hermetic assembly, and a water- 110 tight door for the open end of the cup.

Other novel features will become clear from the detailed description which follows.

A preferred form of the invention is

shown in the accompanying drawings in which:—

Fig. 1 is a part sectional elevation,

Fig. 2 is an end view with the door 5 removed,

Fig. 3 is a front elevation of the door,

Figs. 4—7 show details to a different scale.

According to this form of construction 10 of the invention which is particularly intended for rapidly freezing ice cream, we make the freezing chamber proper in the form of a stainless steel cup 1 with cylindrical walls which, in use, will be in a horizontal position, its extremities 15 being for convenience, termed the forward and rear ends. The steel cup 1 has an open forward end, its peripheral edge being formed as a flange or bead 2. The 20 rear end of the steel cup has a central hole. A central bush 3 is welded or otherwise secured on the outside of this end in this hole.

A gun metal ring 4, is brazed or otherwise 25 securely mounted on the outside of the steel cup with its long limb bearing tightly against the aforesaid flange 2 at the forward end of the steel cup 1 and its small limb directed rearwardly. A cylindrical jacket formed of two concentric 30 cylinders 5—6 is placed in the groove of the metal ring 4 at the forward end and flooded with solder or made gas tight by any suitable means. A second reinforced 35 gun metal disc 7 acts as a cap to the rear end, its periphery also being flanged to form a groove, which fits over the end of the jacket 5—6. It has a centre hole which engages with the bush 3, welded to 40 the steel cup 1, a gas tight seal being again made by flooding with solder and a stainless jacketed gas tight cylinder is thus obtained.

An inlet pipe 8 for the refrigerant is 45 applied to and passes through the jacket 5—6 to the space 9 between the jacket 5—6 and the steel cup 1 whilst diametrically opposite to this inlet pipe the interior cylinder 5 of the jacket is provided with a series of holes 10 causing the 50 interior of such jacket to communicate with the space 9. An outlet hole 11 for the refrigerant or cooling medium is further provided in the jacket again diametrically opposite the communicating 55 holes 10. It will be seen that by this arrangement of the circuit, the cooling medium on entering is caused to impinge directly on the outside of the steel cup 1 60 and cannot reach the outlet pipe 11 without flowing entirely there-around, through the holes in the jacket and back round the outer jacket 6.

The rear disc 7 is advantageously radi- 65 ally ribbed or otherwise reinforced and

provided with a rear side bracket 12, a wooden packing or insulation (not shown) being applied between the plate 7 and the rear end of the composite cylinder if desired. The packing and rear side 70 bracket, are securely held together by suitable bolts or unions indicated by 14 passing through the jackets of cylinder. A front side bracket 12a is, in addition, 75 placed around the flanged, forward end 2 of the steel cup 1 and secured to the rear side bracket by tie rods (not shown). Both the brackets 12, 12a have lugged feet adapted to be screwed to the frame of the 80 machine. An insulation of any suitable nature is also applied to the cylindrical outside surface of the jacket.

A spindle 15 is passed through and 85 guided in the aforesaid central bush 3 and is driven from a suitable source of power preferably disposed within the frame of the machine through a two-speed clutch 16 supported by a bracket 13, or such spindle 90 might be driven directly from such source of power for example through a chain drive. An auxiliary side bracket (not shown), can be, moreover, mounted rear- 95 ward of the bracket 12 when the freezing chamber, driving and other associated means are completely assembled in the manner described, and a hood indicated by 17 is placed over these means and conveniently secured to give the whole a neat 100 outer appearance.

The open forward end of the freezing 100 chamber is adapted to be hermetically sealed by an appropriately hinged cover or door 18 provided with suitable inlet port 19 and outlet port 20 for the cream to be frozen. The outlet port 20 is dis- 105 posed in the lower portion of the hinged cover level with the lowermost portion of the cylindrical interior of the steel cup 1 and adapted to be sealed in a water-tight manner by a suitably shaped 110 spring-pressed plate and a lever attached thereto not shown and not, per se, forming a feature of the invention.

A combined scraper and beater, herein- 115 after referred to as the agitator, is adapted to be rotatably and removably mounted within the chamber 1 so that it may be driven by the spindle 15 above referred to. This agitator preferably consists of a frame of rods comprising a 120 central main rod 15a, two transverse rods 21 secured medially and at right angles thereto and two side rods 22 disposed parallel to the main rod and secured between the said transverse rods. The 125 rear end of the main rod 15a is grooved for engagement in a corresponding projection on the end of the spindle projecting into the interior of the steel tube through the central bush 3 as will be 130

clearly seen in Fig. 1 and the forward end of the main rod co-acts with a recess in the above mentioned cover 18 or is cup-shaped to fit over a step or bearing 18a on the door 18. Scrapers 23 are mounted in staggered relationship on the side rods 22 and others 24 on the transverse rods such that when the agitator is revolving within the freezing chamber, the whole of the interior wall thereof will be swept thereby.

Fig. 6 shows a part cross section of a scraper 23.

The scrapers 23 are advantageously somewhat L-shaped and have their extremities in the form of stirrups so that they may be readily secured to the side rods by means of pins 24a, passed through the limbs of such stirrups and lodged in grooves or notches 25<sup>a</sup> in such side rods.

Figs. 4 and 5 show an edge view and an elevation of a scraper 24 which is secured to the rear transverse bar 21 and is in the form of a bent plate to press against the rear end of the freezing chamber. A small freedom of movement of the scrapers 23 relative to the rods 22 which carry them is thus obtained which, when the agitator is revolving within the freezing chamber, will cause the scrapers to be forced centrifugally against the interior wall thereof, whilst when the agitator is at rest, the scrapers come out of contact with the said interior wall for easy removal of the agitator after the hinged cover is opened.

Beaters 25 in the form of propellers or the like are further mounted on the central main rod 15a and adapted to take up the frozen cream scraped from the wall of the freezing chamber and disintegrate it in well known manner. The scrapers 23, 24 and beaters 25 are moreover arranged in such a manner that the frozen cream is fed towards the hinged cover or door similarly to a worm conveyor so that it may be removed from the freezing chamber by opening the outlet port above referred to without opening the hinged cover and for this purpose the forward transverse rod 21 has at each of its ends an arm, 25a, curved or somewhat obvolute in shape.

The scraper 23 adjacent the rear transverse rod 21 may advantageously have a nose 26 with a notch 26a, the nose projecting into the recess 27 of the upper scraper 24.

It will thus be seen that the present invention provides a comparatively simple and extremely compact device with many advantages over those in current use.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to

be performed, we declare that what we claim is:—

1. Freezing machine comprising a stationary substantially cylindrical cup open at the front end and there provided with a flange, its rear end having a central bush to receive the end of an externally driven spindle adapted to drive an agitator mounted within the cup, a jacket surrounding said cup composed of a pair of cylindrical members assembled gas-tight between flanged rings at each end of the machine and appropriately coupled together to form a hermetic assembly, and a water-tight door for the open end of the cup.

2. Freezing machine as claimed in claim 1 having an inlet connection to the space between the cup and the inner jacket member, a series of holes in the wall of the inner jacket member disposed diametrically opposite said inlet and an outlet from the outer jacket member arranged about diametrically opposite the aforesaid series of holes for the purpose of ensuring that the refrigerant admitted through the inlet shall pass entirely round the outside of the cup before passing into the jacket.

3. Freezing machine as claimed in claims 1 and 2, wherein the agitator consists of a main central rod, two transverse rods secured medially at right angles thereto and side rods arranged parallel to the central rod and connecting said transverse rods, the central rod being carried at one end in or by the door and at the other end being shaped to engage with and be supported by the driving spindle.

4. Freezing machine as claimed in claim 3 wherein the agitator is provided with scrapers mounted on the side rods in staggered relationship.

5. Freezing machine as claimed in claim 4 wherein the scrapers are formed at their ends with stirrups to engage round the side rods and are held with a certain amount of freedom of movement thereon, by pins which engage in grooves cut in the side rods.

6. Freezing machine as claimed in claims 1 to 4 wherein additional scrapers are provided on the transverse rod which is adjacent the closed end of the cup.

7. Freezing machine as claimed in claim 6 wherein the additional scrapers are in the form of a bent plate with a recess cut out at one end.

8. Freezing machine as claimed in claims 1 to 4 wherein the agitator is formed so as to cause the frozen cream to be fed towards the door similarly to a worm conveyor.

9. Freezing machine as claimed in claim 8, wherein the conveying action of

the agitator is obtained by providing the transverse rod near the door end with curved or somewhat obvolute arms.

10. Freezing machine as claimed in claim 3 wherein the central rod of the agitator has mounted thereon beaters in the form of propellers or the like.

11. Freezing machine as claimed in claim 1 wherein the door or hinged cover 10 has an inlet and outlet port.

12. Freezing machine as claimed in the preceding claims mounted on feet and adapted to be fastened to a base.

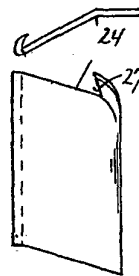
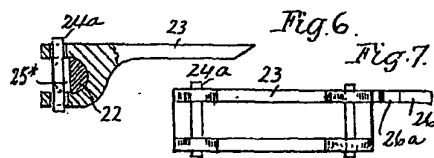
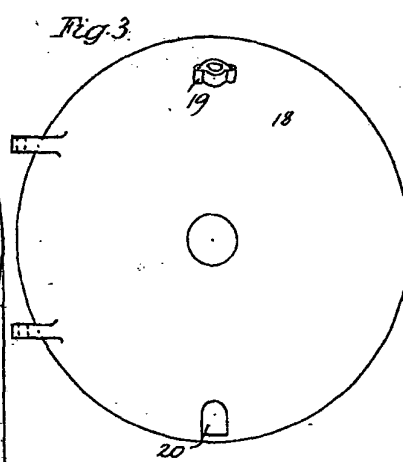
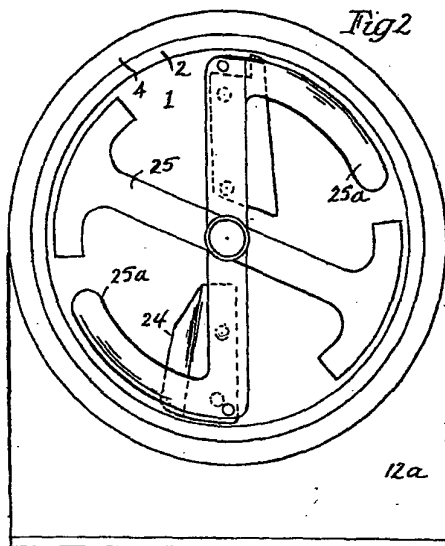
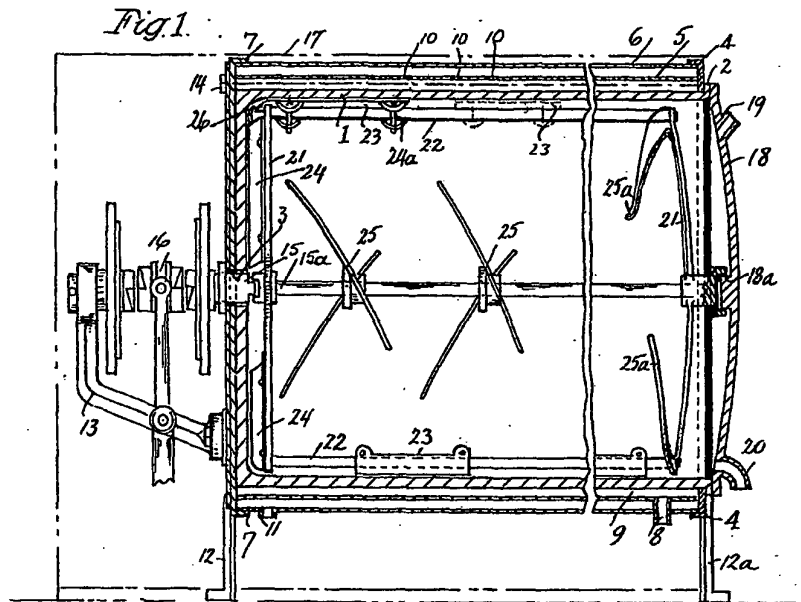
13. Freezing machine as claimed in the preceding claims having an outer hood to 15 enclose the entire machine and its driving means.

14. Freezing machine as claimed in the preceding claims, constructed and arranged for use substantially as shown 20 in the accompanying drawing.

Dated this 20th day of June, 1940.

CHATWIN & COMPANY,  
253, Gray's Inn Road, London, W.C.1,  
Patent Agents for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]



*Fig. 6.*

*Fig. 7.*